

•Christenson and Henke. The newly added claims 25–48 are believed to overcome the grounds for rejection of the canceled claims.

#### **Claim 25**

Claims 25–41 are directed to an RFID transceiver circuit and battery are mounted between two sheets of dielectric film having a layer of a barrier material which is impervious to water vapor. The claimed invention enables an RFID transceiver to be fabricated in an extremely thin enclosure consisting only of two sheets of film, while still protecting the battery from water vapor. Many battery materials, such as lithium, are easily destroyed through exposure to moisture.

Claim 25 is directed to such an RFID transceiver in which the barrier layer on at least one of the two covers of the transceiver is a conductor which is capacitively coupled to the transceiver circuit so as to function as an antenna. This invention is advantageous because many metals make excellent barriers, yet would appear to be unsuitable for a typical RFID transceiver because they would function as an RF shield to block RF signals from being received or transmitted by an antenna enclosed by the covers. The invention overcomes this apparent unsuitability by making the barrier the antenna for the transceiver by capacitively coupling it to the transceiver circuit. None of the prior art discloses a transceiver enclosure having an impervious barrier which is capacitively coupled to the transceiver circuit to function as an antenna. Therefore, the claimed invention is patentable, and claim 25 is allowable.

#### **Claims 26–41**

Claims 26–41 are specifically directed to an RFID transceiver apparatus, and a method of manufacturing RFID transceivers, in which a transceiver circuit and battery are enclosed between two sheets of polymer film having a layer of a barrier material which is impervious to water. Using polymer film as an enclosure is advantageous because it can be very thin and light, which is especially important for making RFID transceivers small enough for use as mailing labels and identification badges. However, a thin polymer film typically is somewhat permeable to water vapor and other gases which will destroy many battery materials such as lithium compounds. The deposition of a barrier layer over the polymer film allows the use of a very thin polymer film while still protecting the battery.

The only cited prior art which discloses barrier materials is Christenson, which discloses a conventional silicon oxide or silicon nitride barrier layer on a silicon semiconductor wafer. However, processes for making silicon wafers are completely different from processes for encapsulating batteries between polymer sheets. Therefore, it is not at all obvious to adapt a process for making silicon wafers to a process for making polymer sheets. For decades silicon nitride barrier layers have been used on silicon wafers, and for decades film packs for instant cameras have included batteries encapsulated between polymer sheets. However, there is no evidence that silicon nitride barrier layers

have been applied over polymer sheets enclosing batteries or transceiver circuits. Accordingly, the claimed invention is patentable, and claims 26-41 are allowable.

Claim 28 is more specifically directed to the above-described manufacturing method in which the barrier is deposited by sputtering, evaporation, or chemical vapor deposition. This claim is patentable for the reasons stated above, and for the additional reason that the recited deposition processes are not conventionally applied to polymer sheets.

Claims 29 and 37 are more specifically directed to the above-described method and apparatus, respectively, in which the barrier material is silicon oxide or silicon nitride. Although these silicon compounds commonly are deposited on silicon wafers, as disclosed in the Christenson reference, for the reasons stated above it is not at all obvious to deposit a silicon compound on a polymer film rather than a silicon wafer. These claims are patentable for this reason as well as for the reasons presented above in support of the patentability of claims 26-41.

Claims 34, 35, 40 and 41 are more specifically directed to the above-described method and apparatus in which the barrier is applied to both sides of a polymer film. The inventors have found that applying the barrier layer on opposite sides of the polymer film typically allows the use of much thinner barrier layers, because any pinholes in one barrier layer are unlikely to be aligned with pinholes in the other barrier layer. None of the references suggests the deposition of a barrier layer on both sides of a polymer film. Claims 35 and 41 further recite the surprisingly thin (100-400 Å) layer that can effectively function as a barrier to water vapor and other gases when the barrier covers both sides of the polymer film. Accordingly, the claimed invention is patentable, and claims 34, 35, 40 and 41 are allowable.

#### **Claims 42-46**

Claims 42-46 are directed to a method and apparatus for storing a plurality of RFID transceivers in an RF shielded enclosure so that selected ones of the transceivers can be removed while maintaining the RF shielding of the others. While the transceivers are stored in the shielded enclosure, the RF shielding advantageously protects the transceivers from receiving RF signals that otherwise could activate the transceivers and run down their batteries. None of the prior art discloses any RF shielded enclosure for storing and dispensing RF transceivers. Therefore, the claimed invention is patentable, and claims 42-46 are allowable.

#### **Claim 47**

Claim 47 is directed to a method of manufacturing a plurality of RFID transceivers by a process in which the transceivers are mounted between two sheets of polymer film which are unrolled from roll stock, and then rolled up again after the transceivers are mounted and sealed between them. The process is especially efficient for the continuous production and storage of large quantities of transceivers. None of the prior art discloses such an unrolling and rolling process. In Hara and

Queyssac, the circuitry is mounted on rigid substrates which could not be rolled up, in contrast with Applicants' use of a thin film. Therefore, the claimed invention is patentable, and claim 47 is allowable.

**Claim 48**

Claim 48 is directed to a method of manufacturing an RFID transceiver by mounting a transceiver on a sheet of polymer film, folding the film in half to enclose the transceiver, and then sealing the two halves together. This method advantageously simplifies the manufacturing process by avoiding the need to align two separate sheets. None of the prior art discloses any process in which a transceiver or other circuit is mounted on a polymer film which is folded in half. In Hara and Queyssac, the circuitry is mounted on rigid substrates which could not be folded, in contrast with Applicants' use of a thin film. Accordingly, the claimed invention is patentable, and claim 48 is allowable.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert J. Stern". The signature is fluid and cursive, with the first name "Robert" and last name "Stern" clearly distinguishable.

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